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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/682,093	10/08/2003	Daniel Luch		9216

7590 03/27/2008

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EXAMINER	
BARTON, JEFFREY THOMAS	

ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
03/27/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)	
Office Action Summary	10/682,093	LUCH, DANIEL	
	Examiner	**Art Unit**	
	Jeffrey T. Barton	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 January 2008*.
2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *19-22,26,27,31-41 and 44-50* is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) *19-22,26,27,31-41 and 44-50* is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a)☐ All b)☐ Some * c)☐ None of:
1.☐ Certified copies of the priority documents have been received.
2.☐ Certified copies of the priority documents have been received in Application No. _____.
3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The amendment filed on 11 January 2008 does not place the application in condition for allowance.

Status of Rejections Pending Since the Office Action of 15 October 2007

2. All previous rejections are withdrawn due to the amendment filed 11 January 2008.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

   1. Determining the scope and contents of the prior art.
   2. Ascertaining the differences between the prior art and the claims at issue.
   3. Resolving the level of ordinary skill in the pertinent art.
   4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 19, 20, 26, 29, 31-41, and 44-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ferguson in view of Lupinski.

Regarding claims 19, Ferguson teaches a combination of an electrically conductive or semiconductive surface (i.e. that of the mounted solar cell) and a current collector structure (Printed circuit assembly used for mounting solar cells) for collecting current from the conductive or semiconductive surface, wherein the current collector structure comprises: a sheetlike substrate having a first surface (Substrate10); a printed circuit pattern (Figures) that is electrically connected to the solar cell's surface. (Abstract)

Regarding claim 20, Ferguson teaches collection of current from the front light incident surface of the solar cell by the printed circuit. (Column 3, lines 53-55 and Column 4, lines 1-19)

Regarding claim 29, Ferguson discloses using an epoxy glass substrate. (Column 3, lines 10-16) Epoxy glass comprises silicon.

Regarding claim 31, the pattern disclosed by Ferguson comprises multiple fingers (Traces 20 connected to pads 18) joined by a bus (Not labeled, but visible in Figures 1-3)

Regarding claim 41, in addition to the disclosure described above for claim 19, the solar cells of Ferguson inherently have conductive or semiconductive surfaces having dimensions defined by peripheral edges.

Regarding claim 44, note the disclosure described above for claim 19.

Ferguson does not describe the printed circuit assembly in detail. The reference is silent concerning the instant first material comprising a polymer positioned on the substrate surface in a trace pattern, and second material coating the trace pattern and forming a second pattern that substantially replicates the first pattern.

Lupinski teaches an advantageous way of forming a printed circuit (Column 2, lines 12-15; Column 10, lines 1-9), comprising providing a conductive polymer layer (i.e. elastomer having powdered metal) on the surface of a substrate, then plating a metal onto the surface of the conductive polymer. (Column 10, lines 15-27; Column 3, lines 20-50) Specific to claims 41 and 44, the conductive polymer has the ability to assist in deposition of a metal (Lupinski, Abstract)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Ferguson by forming the printed circuit using the conductive polymer subjected to electroplating as taught by Lupinski, because Lupinski teaches that this method is suitable and advantageous for producing printed circuits. (Field of the Invention section; Abstract; Column 10, lines 1-27) As Ferguson is silent concerning the manner in which the printed circuit was made, a skilled artisan would have turned to the related prior art teaching manufacture of printed circuits, such as Lupinski, to select a suitable way of preparing the printed circuit.

Within this combination relevant to claims 19, 41, and 44, the conductive polymer layer of Lupinski corresponds to the first material positioned on the substrate in a trace pattern, while the plated metal overlying the conductive polymer corresponds to the second material forming a second pattern that substantially replicates the first pattern. The plated metal in such a combination lies between the first material and all surfaces of the solar cell (See Ferguson Figure 4), and the positioning of the layered structure reads on being "over said conductive or semi-conductive surface", dependent on the particular orientation of the assembly. The surface of the conductive polymer that faces the substrate (i.e. insulating substrate) is devoid of metal coating (Lupinski, Figure 3), and the electrodeposited metal is in electrical communication with the conductive or semiconductive surface. (Ferguson, Column 3, lines 7-52)

Regarding claim 20, the conductive or semiconductive surface is a light-incident surface of a photovoltaic cell. (Ferguson, Column 3, lines 53-60; at least one of the sides of the cell is a "light incident" side.

Regarding claim 26, the conductive polymer of Lupinski adheres to the substrate surface, and therefore reads on the instant polymeric adhesive.

Regarding claims 32 and 50, Lupinski suggests printing of the first material. (Column 10, lines 24-27) However, as this limitation is drawn to formation of a product by process, i.e. printing, it is not given undue weight in examining this product claim. “[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See MPEP § 2113.

Regarding claim 33, Lupinski teaches numerous conductive materials that can be part of the conductive polymer, which are characterized as having the ability to assist deposition of metal. (Column 4, lines 9-75)

Regarding claims 34 and 35, the dispersions of oxides or hydroxides in elastomer disclosed by Lupinski (Abstract) correspond to the instant "electrically conductive polymer". Since Lupinski performs electroplating on these polymers (Abstract), they correspond to "directly electroplatable resin[s]"

Regarding claim 36, Lupinski teaches the material component comprising a seed catalyst. (Column 6, lines 21-29)

Regarding claims 37-39, Lupinski discloses electroplating copper on the conductive polymer. (Abstract; Example 6) Copper is low-melting relative to several other metals, such as tungsten.

Regarding claim 40, Lupinski discloses the deposition process reducing indium oxide present in the elastomer coating to metal. Such reduced metal can be considered a portion of the metal coating after deposition. (Column 4, lines 38-47)

Regarding claims 45, 46, and 49, Lupinski discloses a monolithic metal electrodeposit as claimed. (Copper; e.g. Example 6)

Regarding claim 47, the elastomer that adheres to the substrate in the plateable composition of Lupinski reads on the instant adhesive.

Regarding claim 48, as can be seen in the figures of Ferguson, the traces on the printed circuit board will extend beyond the edges of the solar cells.

6. Claims 19, 20, 26, 27, 32-41, and 44-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koichi in view of Lupinski.

Regarding claim 19, Koichi discloses a combination of an electrically conductive or semiconductive surface (i.e. that of solar cells 1) and a current collector structure (Printed circuit board 7/8) for collecting current from the conductive or semiconductive surface, wherein the current collector structure comprises: a sheetlike substrate having a first surface (Substrate 7); a printed circuit pattern (Conductors 8) that is electrically connected to the solar cell's surface. (Column 3, lines 10-13; Figure 2c)

Regarding claim 20, Koichi discloses the conductors 8 contacting the light-incident side of a photovoltaic cell. (Figure 2c)

Regarding claims 26 and 27, Figure 2c of Koichi shows polymeric adhesive 9 disposed on the surface of substrate 7. Adhesive 9 is shown bonding portions of substrate 7 directly to the surface of cells 1. (Figure 2c; Column 3, lines 22-30)

Regarding claim 41, in addition to the disclosure described above for claim 19, the solar cells of Koichi inherently have conductive or semiconductive surfaces having dimensions defined by peripheral edges.

Regarding claim 44, note the disclosure described above for claim 19.

Koichi does not describe the printed circuit board in detail. The reference is silent concerning the instant first material comprising a polymer positioned on the substrate surface in a trace pattern, and second material coating the trace pattern and forming a second pattern that substantially replicates the first pattern.

Lupinski teaches an advantageous way of forming a printed circuit (Column 2, lines 12-15; Column 10, lines 1-9), comprising providing a conductive polymer layer (i.e. elastomer having powdered metal) on the surface of a substrate, then plating a metal onto the surface of the conductive polymer. (Column 10, lines 15-27; Column 3, lines 20-50) Specific to claims 41 and 44, the conductive polymer has the ability to assist in deposition of a metal (Lupinski, Abstract)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Koichi by forming the printed circuit using the conductive polymer subjected to electroplating as taught by Lupinski, because Lupinski teaches that this method is suitable and advantageous for producing printed circuits. (Field of the Invention section; Abstract; Column 10, lines 1-27) As Koichi is silent concerning the manner in which the printed circuit was made, a skilled artisan would have turned to the related prior art teaching manufacture of printed circuits, such as Lupinski, to select a suitable way of preparing the printed circuit.

Within this combination relevant to claims 19, 41, and 44, the conductive polymer layer of Lupinski corresponds to the first material positioned on the substrate in a trace pattern, while the plated metal overlying the conductive polymer corresponds to the second material forming a second pattern that substantially replicates the first pattern. The plated metal in such a combination lies between the first material and all surfaces of the solar cell (See Ferguson Figure 4), and the positioning of the layered structure reads on being "over said conductive or semi-conductive surface", dependent on the particular orientation of the assembly. The surface of the conductive polymer that faces the substrate (i.e. insulating substrate) is devoid of metal coating (Lupinski, Figure 3), and the electrodeposited metal is in electrical communication with the conductive or semiconductive surface. (Koichi, Column 3, lines 10-13)

Regarding claim 20, the conductive or semiconductive surface is a light-incident surface of a photovoltaic cell. (Koichi Figure 2c)

Regarding claim 26, the conductive polymer of Lupinski adheres to the substrate surface, and therefore reads on the instant polymeric adhesive.

Regarding claims 32 and 50, Lupinski suggests printing of the first material. (Column 10, lines 24-27) However, as this limitation is drawn to formation of a product by process, i.e. printing, it is not given undue weight in examining this product claim. "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See MPEP § 2113.

Regarding claim 33, Lupinski teaches numerous conductive materials that can be part of the conductive polymer, which are characterized as having the ability to assist deposition of metal. (Column 4, lines 9-75)

Regarding claims 34 and 35, the dispersions of oxides or hydroxides in elastomers disclosed by Lupinski (Abstract) correspond to the instant "electrically conductive polymer". Since Lupinski performs electroplating on these polymers (Abstract), they correspond to "directly electroplatable resin[s]"

Regarding claim 36, Lupinski teaches the material component comprising a seed catalyst. (Column 6, lines 21-29)

Regarding claims 37-39, Lupinski discloses electroplating copper on the conductive polymer. (Abstract; Example 6) Copper is low-melting relative to several other metals, such as tungsten.

Regarding claim 40, Lupinski discloses the deposition process reducing indium oxide present in the elastomer coating to metal. Such reduced metal can be considered a portion of the metal coating after deposition. (Column 4, lines 38-47)

Regarding claims 45, 46, and 49, Lupinski discloses a monolithic metal electrodeposit as claimed. (Copper; e.g. Example 6)

Regarding claim 47, the elastomer that adheres to the substrate in the plateable composition of Lupinski reads on the instant adhesive.

Regarding claim 48, a portion of each conductor 8 taught by Koichi lies outside the peripheral edges of the cells. (Figures 2b, 2c)

7. Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ferguson and Lupinski as applied to claims 19, 20, 26, 29, 31-41, and 44-50 above, and further in view of Singh et al. (Sol. Energy Mater. Solar Cells reference)

Ferguson and Lupinski are relied upon for the reasons given above in addressing claims 19, 20, 26, 29, 31-41, and 44-50.

Neither Ferguson nor Lupinski explicitly disclose the photovoltaic cells comprising a thin film semiconductor structure or a metal based foil support as claimed.

Singh et al teach a solar cell comprising thin-film CdTe-CdS structures disposed on Mo foil substrates (Abstract), and teaches that this provides a lightweight cell that is less susceptible to breakage than comparable cells. (Abstract, Introduction Sections)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the combined system of Ferguson and Lupinski by choosing thin film cells disposed on foil substrates, as taught by Singh et al, because Singh et al teaches the advantages of these cells in their relative light weight and ruggedness. (Introduction section)

8. Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koichi and Lupinski as applied to claims 19, 20, 26, 27, 32-41, and 44-50 above, and further in view of Singh et al. (Sol. Energy Mater. Solar Cells reference)

Koichi and Lupinski are relied upon for the reasons given above in addressing claims 19, 20, 26, 27, 32-41, and 44-50.

Neither Koichi nor Lupinski explicitly disclose the photovoltaic cells comprising a thin film semiconductor structure or a metal based foil support as claimed, although Koichi suggests that their system can use any type of solar cell. (Column 3, lines 2-5)

Singh et al teach a solar cell comprising thin-film CdTe-CdS structures disposed on Mo foil substrates (Abstract), and teaches that this provides a lightweight cell that is less susceptible to breakage than comparable cells. (Abstract, Introduction Sections)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the combined system of Koichi and Lupinski by choosing thin film cells disposed on foil substrates, as taught by Singh et al, because Singh et al teaches the advantages of these cells in their relative light weight and ruggedness (Introduction section), and Koichi suggests that their system can use any type of solar cell. (Column 3, lines 2-5)

Response to Arguments

9. Applicant's arguments filed 11 January 2008 have been fully considered but they are largely moot in view of the new grounds of rejection. Insofar as they are pertinent to the rejections above, they are addressed below.

Applicant argues that the term "electrodeposit" or "electroplated" conveys a unique macrostructural connotation. The Examiner appreciates Applicant's position, but must emphasize that any such structural difference must be clearly and definitively demonstrated - not generally asserted. The instant rejections rely on electroplated structure, so this does not appear to be an issue with the current rejections. If future rejections were to rely upon vapor deposited layers, for example, and Applicant believes these to be structurally different from the electrodeposited layers claimed, specific and definitive evidence must be presented. General allegations that "chemical deposits often include characteristic impurities" would not be persuasive. Applicant would be required to present evidence that the particular films relied upon in the prior art have such structural differences relative to structure recited in the claimed layers. Furthermore, description of such a process as "slow" relative to electrodeposition is irrelevant to the structure claimed, and such arguments would not be persuasive.

Applicant further argues that "low melting point metal based material" is common description for metals typically used for solders. No such definition was presented in the original specification, and the Examiner maintains that such a term broadly reads on metals that have low melting points relative to other metals. In the instant case, copper melts at a relatively low temperature compared to tungsten. Even if Applicant's position were accepted, Lupinski teaches indium as part of the metal layer, as cited above, and indium clearly corresponds to such a low melting metal.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Jeffrey T. Barton whose telephone number is (571)272-1307. The examiner can normally be reached on M-F 9:00AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nam X Nguyen/
Supervisory Patent Examiner, Art Unit 1753

JTB
24 March 2008